Dumisane Malinga
(Accredited Facilities
Practitioner)

Controlling the HVAC to reduce costs and complaints

DUMISANE MALINGA'S BIO

- Dumisane Malinga (AFP, CEA), has over 20 years of Leasing, Property and Facilities Management experience.
- Dumisane work experience started in 1998 when he joined the Department of Public Works, and in 2000 joined the Airports Company South Africa as a Property Portfolio Manager and was promoted in 2001.
- In 2001, he was promoted to the position of Duty Manager: Airport Operations Department until he joined Dijalo Property Services as a Leasing and Sales Manager from 2004 to 2006 where his focus was on retail on developing strategic leasing philosophies, tenant mixing and tenant liaison on all new retail developments as well as sales and leasing.
- In 2006 he joined Motseng Property Group as an Executive Director: Property & Facilities Management, in 2008 he was promoted to the position of Managing Director: Property Management; and
- In 2013 he joined Full Facilities Management as a CEO and shareholder in the business.
- Dumisane is a former Board Member of the South African Institute of Black Property Practitioners (SAIBPP) and is currently serving on the SAIBPP's Communications, Events and Marketing Committee and is the Chairperson of the SAFMA Gauteng Chapter;
- Dumisane is currently studying towards his MBA, and holds several qualifications in business, project, property, facilities and financial management.

FFM BIO

- Full Facilities Management is a self-funded black owned and majority black managed company
- Part of a diversified investment holding company
- Entrepreneurial roots founded in rural Kwazulu-Natal, South Africa over 50 years ago
- FFM provides a single point of entry for the coordination of all services relating to the efficient and effective running of a Facility. This includes setting up and running a helpdesk for all services and track work as well as customer activities.
- FFM procures and Manage large contracts i.e. cleaning & technical maintenance to ensure contractors adhere to agreed Service Level Agreement standards
- FFM develops a Facilities Management Strategy and Plan.

HEATING, VENTILATION & AIR CONDITIONING: PROBLEM STATEMENT: COST MANAGEMENT

- 1. Increase energy efficiency
- Building managers often underestimate the value of an energy-efficient HVAC system. To ensure HVAC systems are truly energy-efficient, consider a solution that uses low water temperatures, so it can quickly react to changes in indoor temperature. When a system requires less time to react to temperature changes, it will help reduce the overall energy consumption necessary to keep occupants comfortable year-round.

- 2. Install space-saving systems
- When planning new construction projects, maximizing space can be one of the most effective ways to reduce cost. Instead of traditional, bulky HVAC systems, consider space-saving units to help capitalize on added space. Since space-saving systems free up areas in a building, extra space can be used for an additional floor, which can directly translate to another revenue source in an office or apartment building.

- 3. Use a low maintenance system
- An outdated HVAC system that is constantly failing or requires additional maintenance will drain a building's resources. Ensure that maintenance costs remain low by installing newer, more durable components such as heat pumps, radiators and high-efficiency condensing boilers. Since these systems use the most up-to-date technology, they will require less repair and reduce costs associated with excessive maintenance or replacement.

HEATING, VENTILATION & AIR CONDITIONING: PROBLEM STATEMENT: COST MANAGEMENT

- 4. Be mindful of set-up
- HVAC systems that are poorly set up will end up heating or cooling an empty building and wasting energy. Create a smart plan for HVAC system setup by considering the varying occupancy levels of the building throughout the day and year. If the building is empty during a certain season such as summer, consider significantly reducing cooling requirements during this time. Additionally, if there are times of day when the building regularly has an influx in occupancy, reduce temperatures accordingly to accommodate changes.

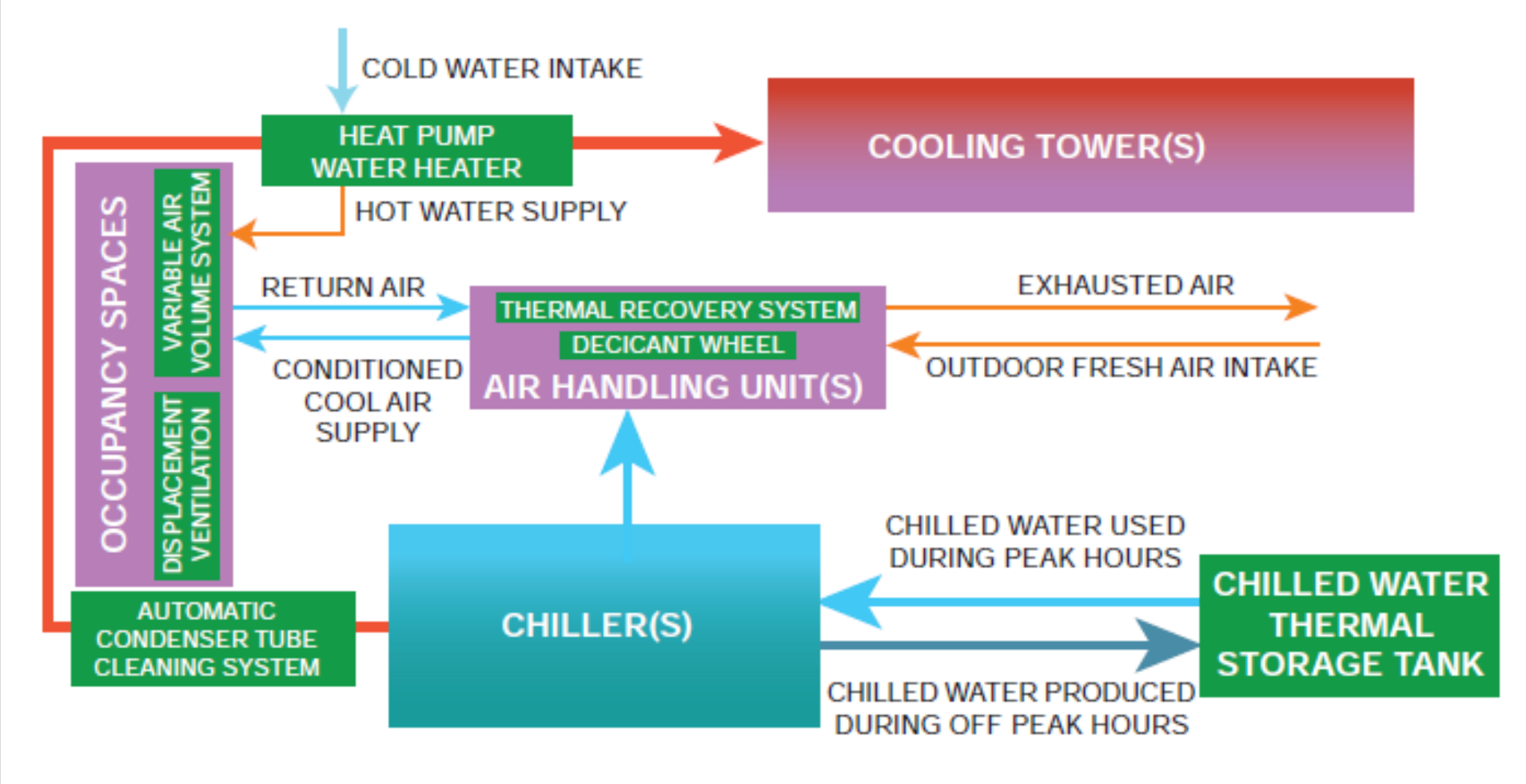
- 5. Utilize renewable energy
- HVAC systems that are used in conjunction with renewable energy sources such as geothermal or solar sources will use considerably less energy than traditional systems. Also, using renewable energy sources with HVAC systems will help eliminate the need to rely on costly and unstable fossil fuel prices. While renewable energy source systems can be a large upfront investment, they provide the highest continual cost-savings through reduced lifetime energy consumption.

- "Often, building managers will just look to one small part of an HVAC system to save money rather than the entire system," says Makarewicz. "By using a holistic approach that takes all parts of the system into account, and using energy-efficient equipment, buildings can significantly reduce one of the primary operational costs.

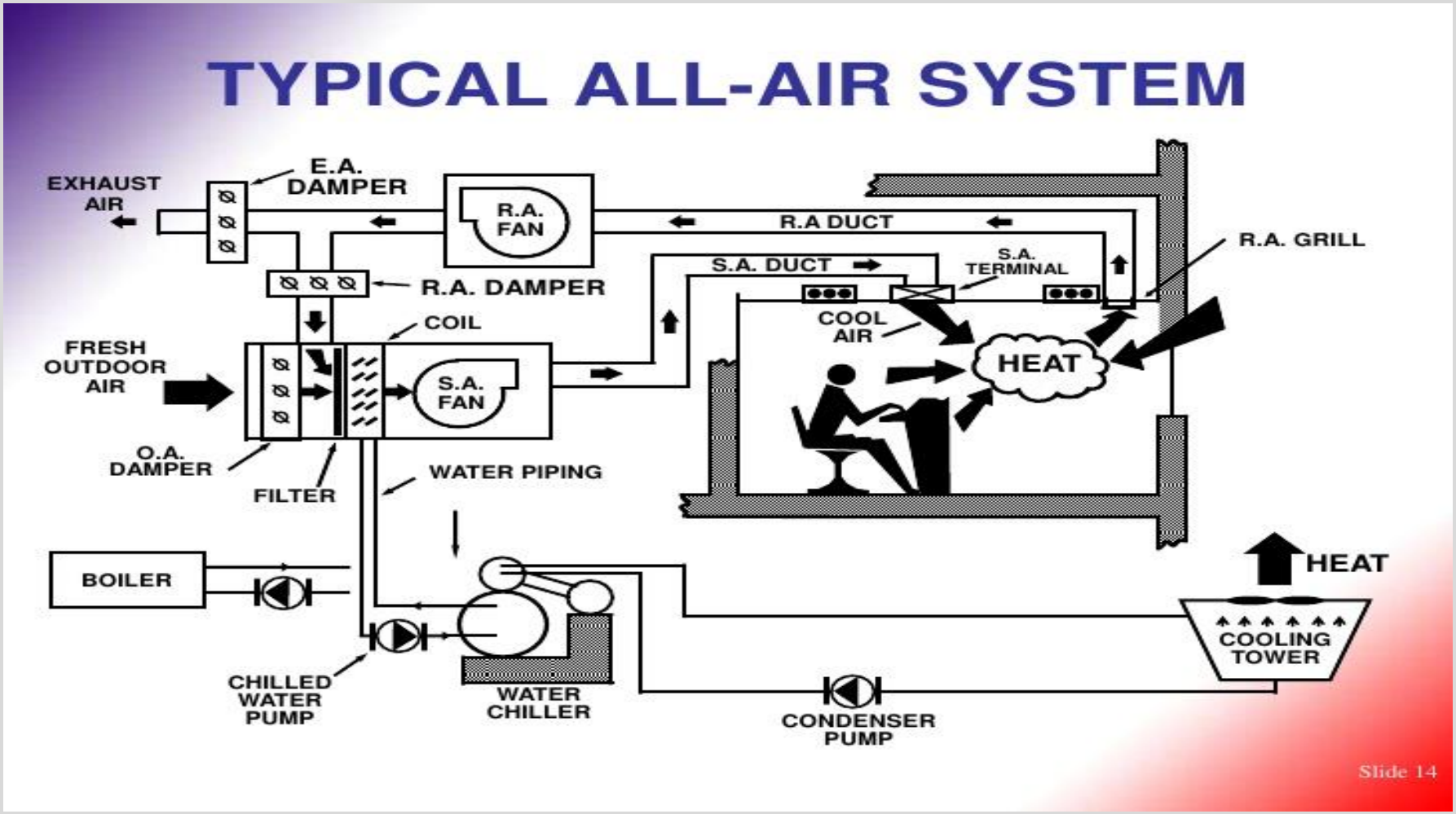
HEATING, VENTILATION & AIR CONDITIONING: PROBLEM STATEMENT

- Heating, ventilation, and air conditioning (HVAC) is the technology of indoor and vehicular environmental comfort. Its goal is to provide thermal comfort and acceptable indoor air quality.
- Temperature settings of between 20º -23º Celsius are relatively comfortable but it is noticeable that your write counter parts prefer their settings at anything between 16º-20º Celsius
- In winter the average comfortable /ambient temperature is somewhere between 23º- 26º Celsius but instances of ±28º Celsius are unheard of
- Dumping cold air is one thing, but having fresh and comfortable air to ward off lethargy and the CO^2 build up is the one thing that most building battle with. In other words, buildings don't "breathe" east-west according to GBCSA

BASIC HVAC SYSTEM

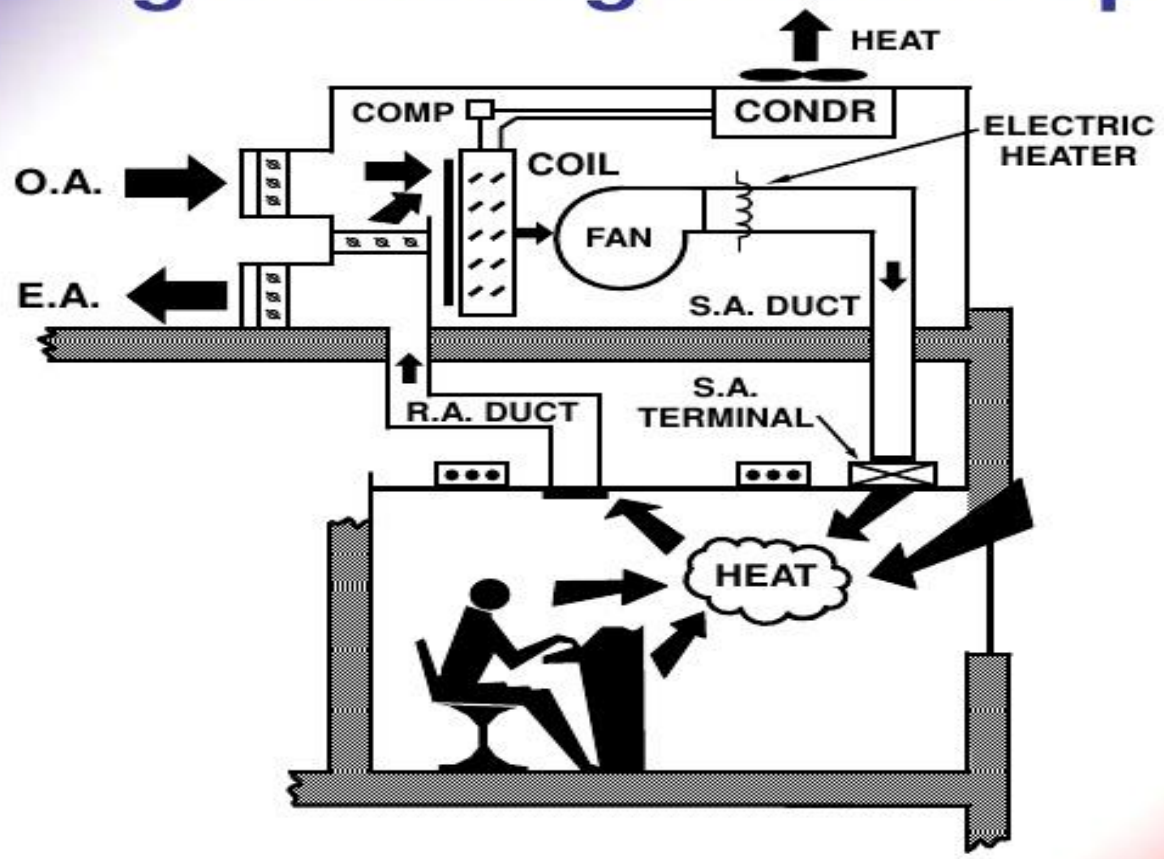


BASIC HVAC SYSTEM



BASIC HVAC SYSTEM

Single Package Roof Top Unit



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IMPORTANT FACTORS FOR CALCULATION OF COOLING LOAD REQUIREMENT

- USE OF SPACE
- PHYSICAL DIMENSION OF SPACE
- CEILING HEIGHT
- CONSTRUCTION MATERIAL
- INSIDE ROOM DESIGN CONDITIONS
- AMBIENT CONDITIONS
- GLASS AREA EXPOSED TO SUN
- OCCUPANCY
- LIGHTING LOAD
- EQUIPMENT LOAD
- FRESH AIR REQUIREMENT
- INFILTRATION OF OUTSIDE AIR

FACTORS AFFECTING THE SYSTEM SELECTION

- BUDGET OF CLIENT
- NEED OF CLIENT
- USE OF SPACE
- AESTHETICS
- FLOOR LAYOUT
- DEPTH OF BEAM
- LOCATION OF COLUMNS
- POWER AVAILABILITY
- WATER AVAILABILITY
- SPACE FOR SERVICING

PROBLEM STATEMENT

- Most organisations aim to maintain a comfortable office environment in summer or winter with air conditioning systems.
- A building's air conditioning system could be described as the lungs of the building. The air conditioning system draws in outside air, filters it, heats, cools or humidifies it, circulates it around the building, then expels a portion of it to the outside environment.
- There are two major areas of air conditioning systems that constitute a risk in the workplace:
- • comfort & • disease

Most common complaints relating to air conditioning are about comfort. Some workers complain that the office environment is too hot while others might complain that it is too cold.

- This is a common issue in almost every workplace with air conditioning units.

The way people experience temperature depends on a range of factors like clothing, body type, individual preferences and expectations just to mention a few.

WHAT THE LAW SAYS

- Section 8 of the Occupational Health and Safety Act (Act 85 of 1993) stipulates that the employer must provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees.
- The same section stipulates that the employer is duty bound to establish, as far as is reasonably practicable, what hazards to the health or safety of persons are attached to any work which is performed. This includes risks associated with air conditioning systems. Risks associated with air conditioning should thus be identified and reduced as much as possible.
- **How can we effectively identify and control risk related to indoor air quality? The following factors should be considered:**
- • Air quality test reports
- • Workplace inspections
- • Complaints from employees about the air quality
- • All complaints should be investigated
- Preventative maintenance programmes for air conditioning systems could proof to be an effective preventative measure as well.

PROBLEM STATEMENT

- Lighting, while a relatively small contributor to the heat build up also contributes to the heat-load. This is more evident in small/confined spaces where there is little or no air-circulation. This will invisibly lead to CO^2 build-up and lethargy
- The other contributing factor is the direction and circulation or cold/hot air.
- Depending on the type and amounts and position or central and split, independent with noise and irritation factors contribute to the HVAC problem.
- HVAC noise can be reduced if not completely eliminated by the use of “soft” finishes such as carpets still 25 or more, thick dry-walling, fitting walling into the ceiling voids, thick/safe glass

A PERFECT BUILDING

- The building orientation also plays a role, an east-west facing building will have a morning /afternoon-afternoon / morning heat and cold disbursement.
- This problem is more “pronounced” in buildings that are window/glass clad. This is for letting in natural lighting as opposed to letting the building breath.
- A design proposition as opposed to the building functionality.

A PEFECT BUILDING

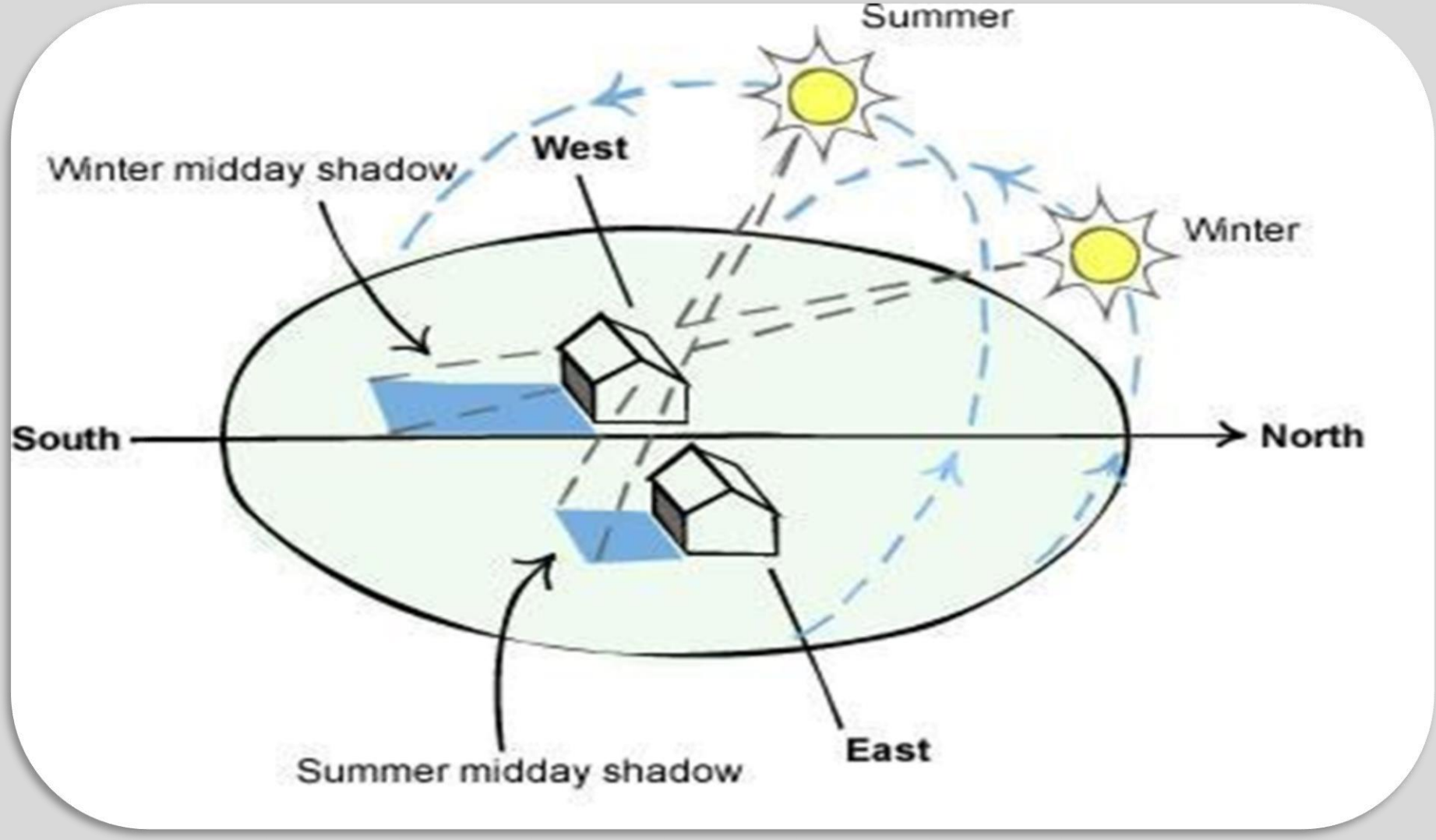

Figure 1: Illustration of a East-West facing building

EXAMPLES OF PERFECT BUILDINGS

Figure 2- Google Headquarters in California, USA

Figure 3-Business Connexion Building in Centurion , South Africa

Figure 4- Department of Environmental Affairs , South Africa

Figure 5: Vodacom Building in Midrand , South Africa

SOME QUICK SOLUTIONS

- The positions of desking in relation to the buildings orientation, glazing and aircon outlets, ceiling heights , ducting and flow rate
- Soft finishes help to reduce white noise and added to optimal layout/placement of personnel reduces the need to have a heavy dumping of “cold” or “hot” air
- Organisational culture (open /cellular offices) also contribute to the optimal usage of HVAC
- Installation of louvres and window tinting on the outside reduces glaze and heat load- preventing heat from coming in as opposed to dispersing the heat.
- Swapping of incandescent lighting with more “energy efficient” and cooler lighting. Use of correct colours, innovative use of lighting and lighting fixture placement also contributes to the “quick” wins.

LONG-TERM SOLUTIONS

- The first prize is the involvement of the FM in the initial scoping, conceptualisation, design and building. This has become a trend-especially the involvement of FM's when new buildings are erected.
- Installation of sensors, BMS systems as part of the comprehensive and balanced solution
- Bolting on the management software, leadership, organisational culture and the proper allocation of resources towards technology.
- HVAC is part of an overall strategy. HVAC, pretty much like the building design and functionality forms part of overall strategic planning. Buildings and the systems are business enablers and should form part of the "centre of gravity" and when designing or choosing a building the "factor/matrix rating" considerations should include the building systems as location and prestige are not the only critical factors.
- Building performance and its user-friendliness should be "considered" against the end-user experiences from the "comfort and ergonomics" perspective over and above the usual performance indicators.

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